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INTESTINAL CONCRETIONS RESEMBLING SAND, AND
ORIGINATING IN CELLS FROM THE BANANA.

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OBSCURE and puzzling cases may eventually prove to be unexpectedly plain. What has been done by one is liable to be repeated by others; hence the history of my cases and of the efforts made to ascertain the nature of the unknown substance which caused them may save time and trouble to some one who might otherwise become involved in a search similar to my own.

Four years ago I washed from the fecal movement of a child a half ounce or more of siliceous, organic cells, closely resembling in external appearances fine black sand. Since that time these cells have been examined by many of the ablest chemists, microscopists, and physicians of the country, who were unable to give any information as to their origin, or even to decide whether they belonged to animal or vegetable life. Twice I read articles on the subject before societies; in one instance before a large audience representing almost every branch of scientific research. Specimens were shown, both in the natural state and with the microscope, but no one present identified them with any known cells. The specimens had been seen and examined by more than a hundred physicians and microscopists, when Dr. Robert T. Edes recognized them as probably of similar origin to those he had described in the *Boston Medical and Surgical Journal* of May 10, 1883, and which had been identified as coming from the banana. My cases are as follows:

CASE I.—Yokohama, Japan, July, 1882. Eva M., aged five years. Only child of American parents, both living; a pale, delicate-looking girl, sedate and precocious, with a history of indigestion, habitual constipation, and occasional attacks of gastric catarrh. The constipation and indigestion commenced when the child was two years of age, and were without apparent cause, but led to such care and watchfulness on the part of the mother and other members of the family that every minute detail of the child's life could be given.

On my first visit, the patient had fever, vomiting, gastric pain and tenderness, a tense, hard abdomen, and constipation. The bowels were relieved with great difficulty. Frequently repeated and large enemata were thrown well up the bowel, but the atony of the intestine was so great that the water was retained and oozed away on a folded sheet placed under the hips. I noticed one morning that this sheet was liberally sprinkled with a fine black sand; the mother said that these gritty particles came from the bowels, caused the child much uneasiness, and that she had folded the sheet differently several times on account of them. They were clean, and there was no appearance of fecal matter or discoloration on the sheet. I saved some of the deposit, and directed the mother to send me the first fecal movement, and as much of the sand as

she could gather. Shortly after, the obstruction yielded to an enema containing one-half ounce fluid ext. of senna, and an enormous and very offensive fecal movement was obtained. The mother sent me only a small portion of it, from which I washed a tablespoonful or more of a substance closely resembling in general appearance fine black blotting sand. I am unable to state how much there was in all, but the mother of the child estimated the amount as two teacupfuls of sand in a chamberful of feces.

The relief was immediate, and practically the end of the case. A month later there was a lighter attack of similar character, but no obstruction in the intestine and only a small quantity of the black deposit. The child passed from under my care a few months later, returned to the United States, and died of diphtheria about two years afterward. Up to the time of her death there were no severe gastric or abdominal attacks, and although carefully looked for, no more black specks were ever seen. Had there been any, I am sure they would not have escaped recognition.

CASE II. occurred in Washington, November, 1885. This was the youngest of several children of parents both living, a girl, six years of age, with a pallid, muddy complexion, and a history of malaria, constipation, pasty clay-colored stools, and worms (?). There was a distended but tympanitic abdomen, pain in the left side just below the ribs, but no acute symptoms. The urine was normal, and no enlargement of liver or spleen was detected. It was only because I was attending another child in the same family that my attention was called to this case. The mother stated that at frequent intervals, for two years, she had given the child *santonin* and castor oil for worms, and always with good effect. No worms had ever been seen, only "eggs and skins." I prescribed the same remedies, and requested that all the movements should be saved. The result was the same as on previous occasions, but the so-called worm skins were long strings and shreds of tough mucus, and the eggs, although in small quantity, at once recalled my Yokohama experience.

I have heard of three, perhaps four, similar cases; one in Japan, one in Washington, one in Ohio, and the fourth in Massachusetts. Of the first, Dr. Stuart Eldridge, of Yokohama, writes:

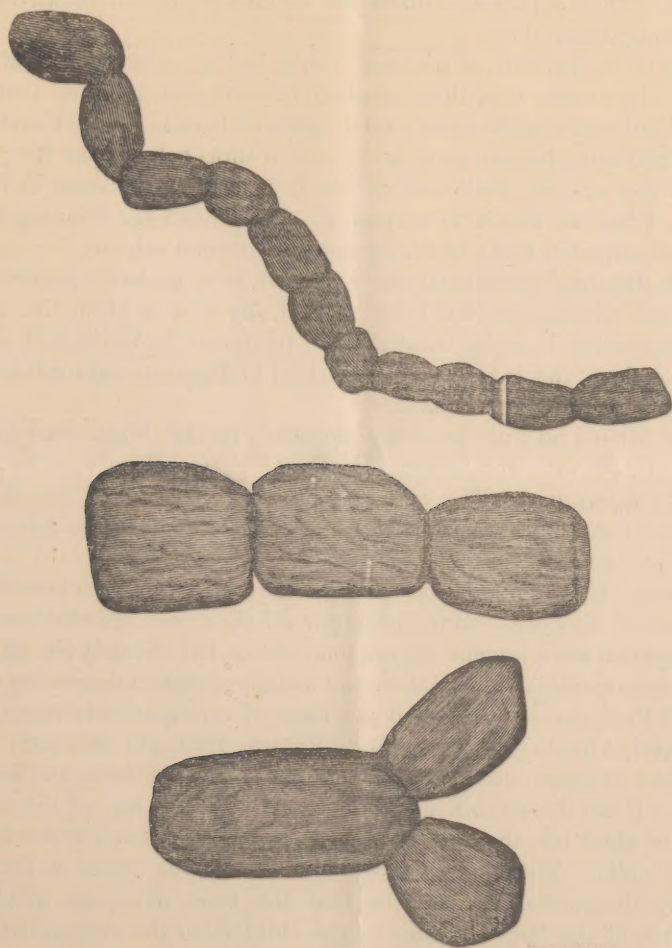
CASE III.—"The child was, in this case, though stout and fairly strong for its age, three years, and previously, according to the mother's account, perfectly healthy, of a pasty complexion, and for some days before I saw it troubled with colic-like pains, which were relieved by a stool, to recur spontaneously within twelve to twenty-four hours. I was sent for because the mother detected the abnormal particles in the stool; these were so plentiful in the specimen I examined as to form nearly one-fourth of the whole mass, the amount sent me being that of a good copious evacuation." "The grains were exactly like those" in the Eva M., Yokohama case. This case was not seen again, and no further history obtained.

CASE IV. is reported to me by Dr. C. H. H. Hall, U. S. Navy. His own child, a boy, three years of age, passed a half teaspoonful of black, sandy-looking grains after a dose of *santonin* and castor oil had been given—none had ever been seen before, and although looked for, none have been seen since. No examination was made, but in general appearance they resembled my specimens.

CASE V.—The clinical history is wanting. Prof. Romyn Hitchcock received some years ago, from a physician in Ohio, specimens which he is quite sure were the same as mine, but he does not now know who sent them nor the history of the case.

I have been promised the details of a case occurring in the practice of a physician in Salem, Mass., but have not received them.

In my cases the cells were of such peculiar character that identification would have seemed comparatively easy; yet it was in their most striking characteristics that they differ from the banana cells in their natural state, where they are white, translucent, and only resemble in size and form the objects from the intestine. If a transverse slice of



banana is placed in a watch-glass and covered with strong nitric or sulphuric acid, a double row of cells, with a spiral fibre between, will become visible, enclosing three lobes in the centre of the slice, and the cells will eventually become of a garnet-red color. They are not so deep in color as my specimens, and have not the weight and resistance, but otherwise resemble them closely.

The cells from my Yokohama case could not be readily cut or crushed;

were deep red-brown in color; had a sp. gr. 1.59; and contained four per cent. of silica. With the naked eye and sense of touch they could not have been distinguished from so much blotting sand. As passed from the bowel on the sheet they were perfectly clean, free from fecal or other adherent matter, with nothing to give any clew to their origin, except size, form, and the manner in which they were joined together, and in none of them was there anything which could indicate a probable source. Their appearance under the microscope is well shown in the preceding illustrations.

One of my patients, so the mother said, had never eaten fruit of any kind. In answer to a direct question, however, she admitted that the child had occasionally eaten a small piece of banana. The Yokohama child had eaten banana quite freely some months before I saw her; but, as the fact was not mentioned, and the fruit not at all common in Yokohama, I had no reason to suspect it. I examined the drinking water and all suspected foods, including native fruits and candies.

The Japanese persimmon was suggested as a probable source by a Japanese microscopist, but I did not find any cells in them like mine. I have recently thought, however, that treatment by nitric acid might develop them, and have requested a friend in Japan to make a thorough examination of the persimmon.

The banana may not be alone responsible for this black sand in the intestine, but with the recognition of one source, others may be more readily ascertained. The number of cases collected, and the clinical history of some of them, are enough to give these objects sufficient importance to be remembered.

A suspicion of entozoa was or might naturally have been entertained in most of the cases. So far as known, all the cases were children, and constipation was a prominent symptom. Some, but certainly not all, may have been constipated from birth, and had the elongated descending colon which Prof. Jacobi has noticed as a cause of constipation in infants.

Severi, Alberto (*Lo Sperimentale*, Firenze, 1884, xiii. 482-508) gives statistics of measurements of the large intestine in the fœtus and in children. From the seventh month of fetal life to the end of the second year of child life, the length of the large intestine exceeds the length of the child. With increased age and growth the excess is lost, and finally disappears. It may be that the more numerous folds and flexures of the large intestine of the child favor the accumulation of these objects, and that the intestine in later life is not adapted to their retention.

At all events, I am disposed to regard a prolonged stay in the intestines as necessary for the development of the deep color; hard, sharp, and gritty character; high specific gravity, and siliceous contents of these cells; and when thus developed, they are no more innocent than would be a corresponding quantity of sharp sand.